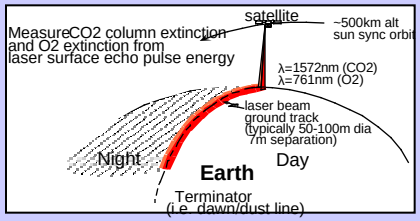
ATI Selected Proposal Highlights

Active Optical

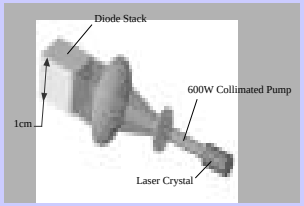
Laser Sounder Technology for Atmospheric CO2 Measurements from Space (069)



Technology area

Measurement of CO_2 and O_2 column extinction from laser surface-echo pulse

High Efficiency Remote Sensing Laser Technology (022)

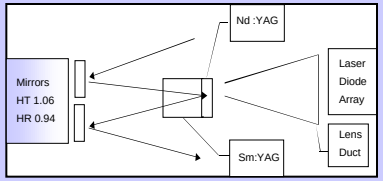


Ten bar stack of lensed arrays capable of 600 watts QCW pumping.

Technology area

High Performance solid-state laser diode pumping modules to increase electrical efficiency from 6% to 25%

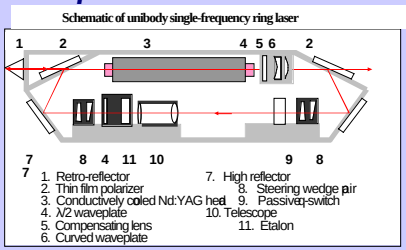
Water Vapor Dial Transmitter at 0.94 Micrometers (84)



Technology area

Efficient Laser transmitter for measuring water vapor using the DIAL technique around 0.94 mm to double efficiency of a comparable Ti:A12O3 system

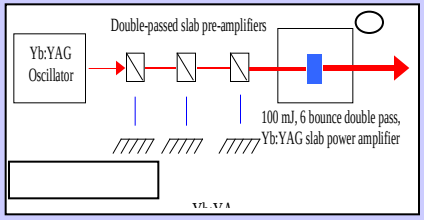
High Efficiency, Double-Pulsed, High Beam Quality, Nd Laser for Global Ozone Measurements (054)



Technology area

Space qualifiable 1um laser technology for space-based ozone DIAL instrument

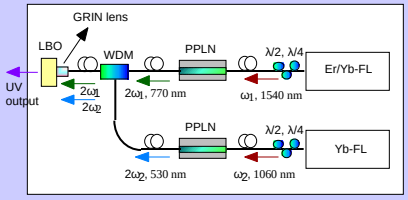
Efficient, Compact, Conduction Cooled Laser Diode-Pumped Yb:YAG Laser for Atmospheric Composition and Ozone Measurements (032)



Technology area

Edge-pumped Nd:YAG slab laser design extended to YB:YAG for increased energy storage

A Compact, Highly-Efficient, and Rugged All Solid-State UV Source Based on Fiber Lasers for UV-DIAL (105)

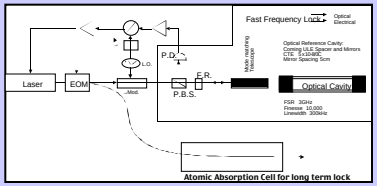


Technology area

Highly efficient, compact, light, rugged, tunable UV source based on high power Q-switched Yb-doped and Er/Yb-doped fiber lasers.

ATI Selected Proposal Highlights
Active Optical (Continued)

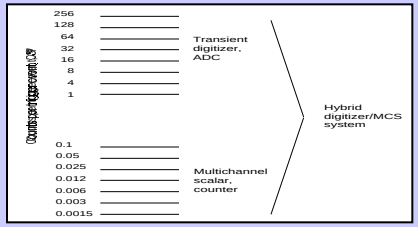
Diode Laser Stabilization for Optical Metrology: an Optical Atomic Clock in Support of the Time-Varying Gravity-Mapping Mission (066)



Technology area

An optical atomic clock delivering 100 mW optical power at 852 nanometers with fractional frequency stability of 10^{-13} from 1ms to 1000 seconds

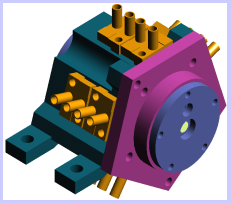
Ultra-High Dynamic Range, High-Speed A/D Converter for Laser Ranging (Hybrid Digitizer [HD]) (059)



Technology area

Extending the dynamic range of high-speed ADCs based on an algorithm that enables a transient digitizer to also act as a mcs/counting system, i.e., work in a pulse-counting mode simultaneous with detection of both strong and weak signal limits. Builds on SBIR project.

Efficient, Conductively-Cooled, Double-Pulsed 2-micron Laser Transmitter for Multiple Lidar Applications (092)

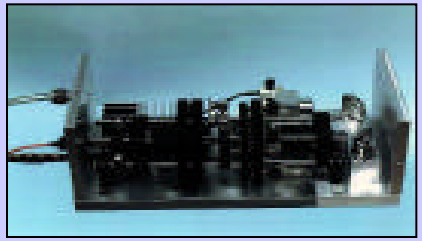


High Thermal Conductivity C-C Composite Dissipaters

Technology area

2-micron laser transmitter capable of generating in excess of 500 mJ at 10 Hz pulse repetition frequency (PRF) and improve the wall plug efficiency (WPE) to 5%

Advanced Optical Heterdyne Receiver Development for Coherent Doppler Wind Lidar (052)



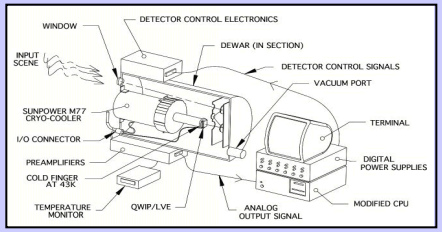
Technology area

Novel semiconductor laser frequency-agile local oscillator technology with direct application to coherent lidar remote sensing of atmospheric winds from Earth orbit

ATI Selected Proposal Highlights

Passive Optical

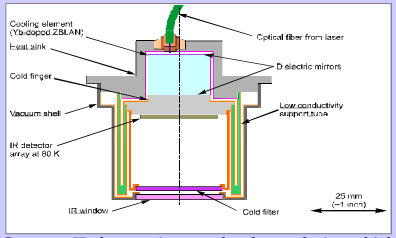
Development of Monolithic GaAs Hyperspectral Infrared QWIP Imaging System (100)



Technology area

Four band GaAs Quantum Well Infrared Photoconductor array, state-of-the-art cryocooler, complete pushbroom camera system, front-end optics, and a drop-in linear variable etalon subassemblies integrated into compact Hyperspectral QWIP Imaging system.

Optical Cryocooler Development (060)

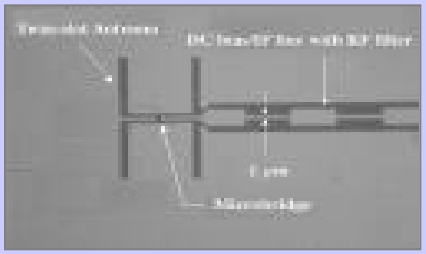


Compact IR detector/cryocooler dewar design which produces 400 mW net heat lift at 80 K.

Technology area

Using optical refrigeration by fluorescence to provide solid state cooling well below current 180K limit with thermoelectric coolers

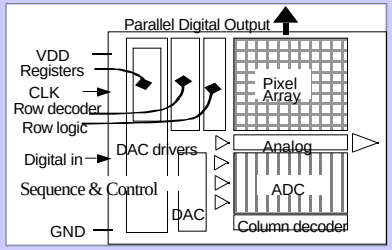
Small and Smart Sensor for Atmospheric Terahertz Limb Sounding (003)



Technology area

YBCO mixer with noise temperature expected to be 2 - 5 times lower than a Schottky mixer to allow 4 - 25 times data collection with the same signal to noise.

Multi-spectral Staring CMOS Focal-Plan Array for Oceanographic Imaging Applications (57)



Technology area

Advanced, low-cost, compact, high-resolution, Vis/NIR staring multi-spectral digital focal plane array based on CMOS Active Pixel Sensor and Surface-Plasmon-Tunable-Filter technologies

Wide Field of View Adaptive Optical System For Lightweight Deployable Telescope Technologies (063)

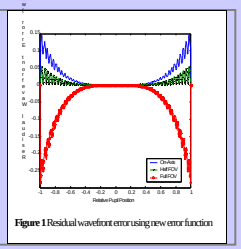


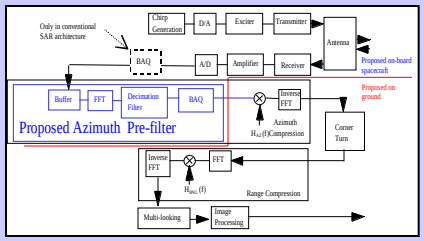
Figure 1 Residual wavefront error using new error function

Technology area

A combination of novel actuation of the primary mirror, along with a steering mirror, and an adaptive optic to achieve optimized image quality.

ATI Selected Proposal Highlights
Active Microwave

Synthetic Aperature Radar (SAR) On-Board Azimuth Pre-File Processor (047)



Technology area

ASIC technology based signal processing unit to perform part of the SAR signal processing on-board and significantly reduce BW needed to return to science data

A Ka-Band Active Array for Remote Sensing of Precipitation (034)

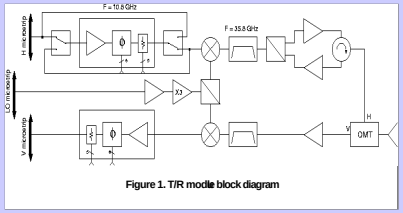


Figure 1. T/R module block diagram

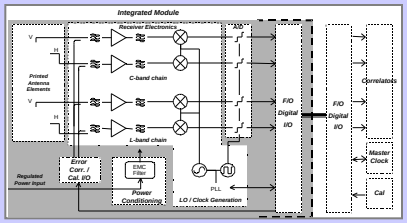
Technology area

Ka-band electronically-scanned, dual polarized transmit and receive active array scaled prototype

ATI Selected Proposal Highlights

Passive Microwave

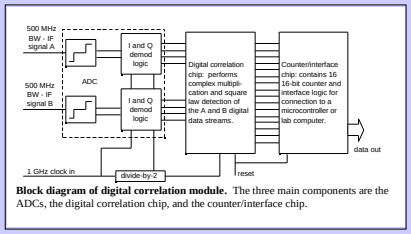
Development of a Low Power, Miniaturized Module for the Next Generation of Microwave Radiometers (101)



Technology area

A receiver module with a power consumption of 1 W power per module and a mass of 0.8 kg per module.

Ultra Low--Power Digital Correlator Detector for Microwave Polarimetry and Radiometry (097)

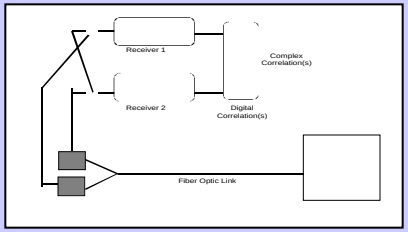


Block diagram of digital correlation module. The three main components are the ADCs, the digital correlation chip, and the counter/interface chip.

Technology area

Integrated digital correlator for passive microwave polarimetry (i.e., polarimetric radimetry)

Controlled-Correlation Subsystem for On-board Receiver Calibration of Synthetic Thinned Array Radiometers (STAR) and Fully-Polarimetic (FP) Microwave Radiometers (093)



Technology area

A low-cost, compact, low-power subsystem for in-flight STAR and FP receiver calibration with fiber-optic distribution link.

A256 Baseline, 2-bit Cross-Controller Chip for a Spaceborne Synthetically Thinned Aperature Radiometer (095)

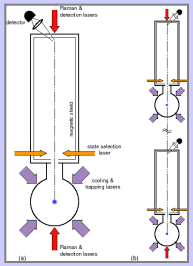
No Graphics In Proposal

Technology area

Radiation-hard, 256-baseline correlator chip and engineering model of a 9,216-baseline cross-correlator subsystem dissipating less than 4.5 w

ATI Selected Proposal Highlights
Other

Quantum Interference Gravity Gradiometer for 3-D Sub-Surface Mapping (051)

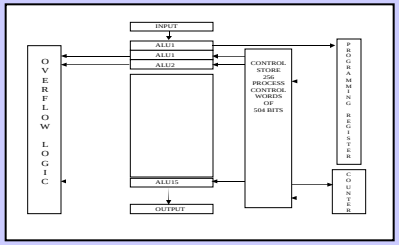


Technology area

Atom-interferometer gravity gradiometer. (a) Single atom interferometer, showing cooling and trapping, and Raman laser beams. (b) Dual atom interferometers in the gravity gradiometer configuration.

Reprogrammable Data Path Processor (106)

Technology area



General purpose Reprogrammable Data Path Processor (RDPP) Application Specific Integrated Circuit (ASIC) component applicable to multiple classes of scientific instruments requiring pre-processing of data on board. This onboard processor can process complicated scientific algorithms in real time at high speed with low power and with a goal of 48 GOPS per watt.